

CA3 ON HW Q90

91 B11

URBAN/MUNICIPAL

BACKYARD COMPOSTING:

DESIGNS & INSTRUCTIONS

CA3 ON HW Q90 91 B11

URBAN/MUNICIPAL

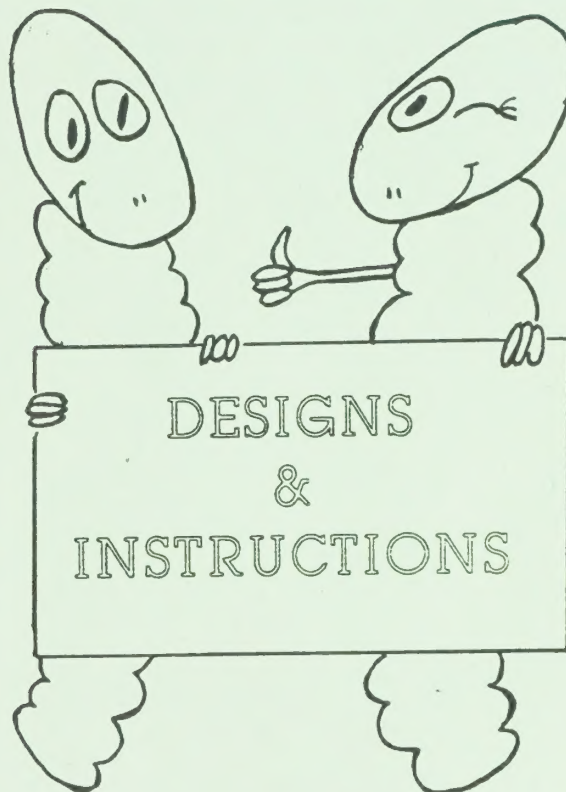
BACKYARD COMPOSTING

URBAN MUNICIPAL

JAN 3 1991

GOVERNMENT DOCUMENTS

WE WORMS
KNOW IT!
COMPOSTING IS
GOOD FOR THE
COMMUNITY ...



AND GOOD
FOR YOUR
GARDEN
TOO!



THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
DEPARTMENT OF ENGINEERING, SOLID WASTE SECTION
71 MAIN STREET WEST, HAMILTON, ONTARIO L8N 3T4
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<https://archive.org/details/backyardcomposti00unse>

1. WHAT IS COMPOSTING AND WHY IS IT A GOOD THING TO DO?

Composting is a natural recycling process that breaks down organic waste into a soil-like product. The compost produced from organic wastes such as leaves, grass clippings, kitchen scraps, and garden leftovers, can be used as a conditioner to improve soil so it is better able to hold moisture, nutrients, and air. In this way clay soil, sandy soil and soil prone to erosion can be made more healthy and better able to support plant life.

As plants grow they draw the nutrients they need out of the earth. In a forest these nutrients are returned to the earth naturally as the plant dies and decomposes. Decomposing means that the plant breaks down into the materials of which they were made. Similarly, composting allows the nutrients from plants to be returned to the soil.

We can easily provide ourselves with a constant supply of materials which we can compost and use in our garden, since approximately 1/3 of all solid waste we throw away is organic matter. At the same time we would be reducing the amount of waste that needs to be buried in our landfill sites.





Basically, composting requires mixing different types of organic materials with air and water, in layers, and leaving it to be broken down by micro-organisms which use it as food. For example worms.

These organisms create heat as they feed on the organic materials and it is this heat which in turn kills the harmful diseases and organisms which are produced as the materials rot.



Depending on the method of composting which you choose (see Section 4), composting can be simple or somewhat complicated. Most methods require that you add air, water, and turn the materials often. Some, you do not have to touch again after the pile is built. Others, usually the manufactured variety, suggest that you need chemical additives, special turning tools or strict turning schedules. But, whatever you do to it or however you do it you will always end up with some sort of organic material to put in your garden. You may find that it takes some practice to get the conditions (speed, texture, acidity, work) to your liking but you will not be wasting your time.

Specific odour and animal problems can arise if you compost items such as meats, bones, dairy products and fatty foods. By consulting the Troubleshooting Chart (Section 9) or other books on composting, you should be able to get some ideas on what is causing the problem and you should be able to correct it. For instance, if you put in a thick layer of wet grass and do not mix it properly, it will compact and matt. It will decompose very slowly and will probably smell. On the other hand if the grass is mixed in well, the pile is as moist as a damp sponge, and there is plenty of air mixed in, a bad odour will not be a concern.

2. LENGTH OF TIME

The length of time it takes to get compost depends on the method you choose (see Section 4) and the size of the materials that you put in it. The smaller the pieces, the faster they will break down. You will know it is done when it no longer heats up after it is turned.

3. WHAT CAN I COMPOST?

YES

- vegetable/fruit peelings
- dry leaves and grass clippings
- ground bone meal
- coffee grounds, tea leaves
- wood ashes from a fireplace or stove, but not charcoal or coal ashes
- fresh weeds (before they seed)
- small quantities of: sawdust, BBQ grill residues, clam/oyster shells
- house plants, cut flowers
- straw, hay
- egg shells (rinsed)
- nut shells
- corn cobs
- shredded paper
- avoid meat, dairy products and cooked food since they could attract pests and animals*

NO

- grass/tree trimmings which have been treated with pesticides or herbicides
- rhubarb leaves and walnut shells because they could contain toxic chemicals
- charcoal or coal ashes
- walnut leaves

4. CHOOSING A COMPOSTING METHOD

Composting can be done in many different ways. You can simply pile up your materials in a heap in your backyard, or dig it into rows near your garden. You may also wish to construct or purchase boxes, bins, barrels or plastic bags to keep things neat and organized. Mulching, leaving grass clippings, twigs and leaves on the ground, is also a form of composting.

Grass and leaves alone will not attract a lot of pests as they decompose, but kitchen waste such as vegetable and fruit cuttings can, since they create more odours. In most cases, kitchen waste should be composted separately from yard waste and in a closed or covered system which physically keeps out pests. If you are willing to pay a lot of attention to the pile and turn the compost on a regular basis you can compost both together. You can eliminate the odour from kitchen wastes by digging them into the pile immediately or spreading a thin layer of soil over them.

Therefore, when you decide to start composting, you should keep in mind the type of materials you will be composting, how much space you have in your backyard, how soon you want the compost, and how much energy and time you will be able to devote to your composter. The best method will be one that turns your home's organic waste into fertile soil, quickly, cheaply, and easily.

Your efforts will benefit your whole community by reducing the amount of solid waste taken to the curb, picked up, then buried in our landfills, and personally you will benefit by cultivating a more productive and beautiful garden.

5. COMPOSTING METHODS

(For some specific instructions and designs, see the Appendix "Composter Designs and Methods")

Holding Units (Examples on Pages A1 to A4)

Large amounts of yard waste such as leaves, grass and shredded or chipped wood can be left to compost in holding units. Holding units usually have a very simple design and can be made with wire fencing or wood. They can be moved around your garden wherever they are needed and may take from six months to two years to fully compost your materials. This is the simplest way to compost as it requires no turning or other labour except for placing wastes into the bin as you get them. You can speed up the process by chopping or shredding wastes, mixing green and brown materials (see Section 5), and maintaining proper moisture.

Generally, the most finished compost is the oldest material at the bottom, therefore when it looks dark and crumbly (but not lumpy), it is done. At this point you can disassemble the unit, remove the finished compost, shovel the unfinished compost back into the bin and it is ready to have more materials added on top. The best system is to have 2 holding units - one to use for fresh wastes and the other for aging compost.

Turning Units (Examples on Pages A5 to A9)

Another good system for large amounts of yard wastes is turning units. This usually involves a series of three or more bins placed side-by-side. The materials in them are mixed up and turned on a regular basis. The more air mixed in with the materials, the higher the temperatures created and the shorter the composting time required. Depending on how much material you have and how often you turn it, you can produce compost in one to six months. You can add kitchen wastes to turning units so long as you turn them weekly and have the proper mix of materials in with them.

Whether you buy a manufactured turning-type unit or construct your own out of wood and wire, it could be a costly venture. But this is totally up to you and how involved you want to get. A pitchfork will accomplish the same task as a special turning tool but may require a little more physical effort.

Mulching

Mulching is another method which is potentially costly. This depends mainly on whether you buy or rent the machinery for the job (e.g. a lawn mower with a mulching attachment, or a wood chipper). You might find it worth your while to buy a mulcher or chipper and rent it out to friends or neighbours. Mulched materials are very good for weed control and water retention around trees, shrubs and other perennial plants and garden paths.

Soil Incorporation/Burying Wastes

For kitchen scraps such as vegetable and fruit peelings, the simplest method of composting them is to chop them, mix with soil and bury them in the ground. This is called soil incorporation. A disadvantage of this method is that because of the lack of air under ground, there will be more odours created, therefore the wastes must be buried a least 8 inches from the surface to prevent dogs and rodents from creating a problem. It will take from one month to one year to decompose properly in this method, so you can plan a convenient schedule where you rotate rows of plants and buried compost in two or three year cycles. (See Composter Methods Page A10)

Worms/Vermicomposting

One other method for composting kitchen wastes is by worms. Feeding redworms (not your average earthworms) in wooden or plastic bins is a good way to make high quality compost from food scraps. If you make portable bins, it also becomes a way to compost during the winter months - indoors.



Worms are "bedded" in bins with moistened, shredded newsprint, cardboard or peat moss etc. and food wastes are buried in a rotating pattern throughout the bin. The worms turn the food wastes into a high quality soil conditioner which can be used on houseplants, vegetable seedlings and flowers. Two or three times a year a few hours are spent bedding and harvesting the compost and worms. Again, it is best not to try to compost fatty foods, meats and bones.

For greater detail and information see Page 12 and the resources list for the book "Worms Eat My Garbage".

6. HOW MUCH DO I PUT IN? or the CARBON/NITROGEN RATIO

As previously mentioned, composting can be very simple or fairly complicated depending how you look at it and how you do it. This section is written to try and help you understand a little more of the biological theory behind the composting process but basically what happens will be up to you.

It is a trial and error process just like creating a new recipe for spaghetti sauce. The ingredients you use should depend, mainly, on what is normally available in your home. The chart below is limited to currently available information on the topic but the basic idea is there. It is not necessary to go out and buy sawdust for example since shredded leaves can be substituted (in the proper amount).

Just like when one makes plaster of Paris or bread from scratch, adding too much or too little of one ingredient will not create a good product. The same is true for creating a compost pile which will provide you with a nutrient-rich soil conditioner for your garden and plants. The mixture of wet and dry ingredients going into the pile is important.

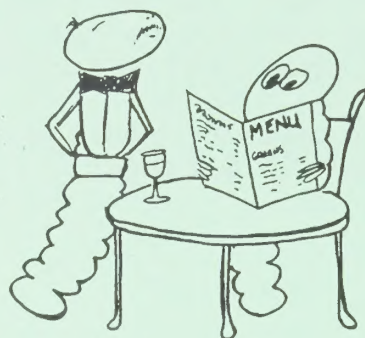
In the case of compost, the wet ingredients such as vegetable cuttings, generally contain large amounts of nitrogen, an element which is important for the production of good soil and healthy plants. Carbon is another important element which can be found in woody materials such as sawdust, wood, cornstalks and dry leaves. The amounts of each of these elements in materials is often compared and called the carbon/nitrogen ratio. You may see this term in some other books or publications in ratio form and indicated by a number in a chart. Below is a chart which we think is simpler to understand and follow.

All you have to remember is three basic rules of thumb. One, that most vegetables or parts of vegetables, are green and most wood and woody materials are brown. So let's use the terms "greens" and "browns". Next you should remember that "greens" have a lot of nitrogen in them and "browns" have a lot of carbon in them. This is how we created our chart.

GREENS

(Low C:N ratio #, High Nitrogen)

vegetable scraps	15-25
fruit peels	35
grass clippings	20
old horse/cow manure	20



BROWNS

(High C:N ratio #, High Carbon)

leaves	25-80
shredded paper	170
straw	80
sawdust	170
wood chips	700
coffee grounds	20-30
cornstalks/cobs	60
peat	10

Thirdly, remember that the compost will be better balanced and will decompose more easily if you have a good combination of materials in it. Problems may arise in your compost pile if you have too much of either greens or browns. Too many browns will cause the pile to be dry and it will not allow the materials to heat up and break down properly. Too many greens will cause the pile to be, generally, too wet and compacted and may create an ammonia smell.

The first time you make a compost pile you should start off with using the same amounts of greens and browns (for instance 10 shovelfuls each) and alternate them in layers, (adding water of course as you go). You'll probably find that it takes approximately 2-3 parts greens to 1 part browns. Technically, a 25 or 30 to 1 carbon/nitrogen ratio is best. Once you construct all your layers you can use your pitchfork to mix the pile up completely.

After a week or so, you can check to see if the materials are moist enough (they should be no wetter than a damp sponge), and if they are getting warm. Follow the chart in Section 9 to troubleshoot any problems that may arise.

For more information on the carbon-nitrogen ratio or greens and browns, check some of the books listed in the Resources and References Section on Page 12 (for example #10 and #14).



Experiment with different amounts and combinations of materials and soon you will have an excellent "recipe" for compost.

7. THE BEST CONDITIONS

The best spot for your composter or compost pile is in an area with good drainage (where water does not puddle) but within reach of your water hose. Direct sunlight will dry out your pile and may damage some commercial composters so it would be best to pick a shady spot for all types. Cold weather will not destroy the compost but will slow the process down. You can continue to add material to your pile throughout the winter and let it freeze. In the spring the pile will thaw and become active again. Insulate your compost pile by covering it with thick, dark plastic sheeting or thick layers of leaves, hay or straw to delay freezing. Plastic sheeting will also help to keep the compost pile from becoming overly wet.

8. USING THE FINISHED COMPOST

When the compost is ready to use it will not heat up any more after it is turned. It should be sweet smelling and look dark and crumbly. You should not be able to tell what the original materials were that went into it, except for maybe a few nut shells, egg shells or woody plant matter. You may want to screen the compost with a 0.6 to 2.5 cm (1/4" to 1") wire mesh screen to separate out the coarse or incompletely decomposed material or simply rake them out. This material can be put back into the compost bin for the next load.

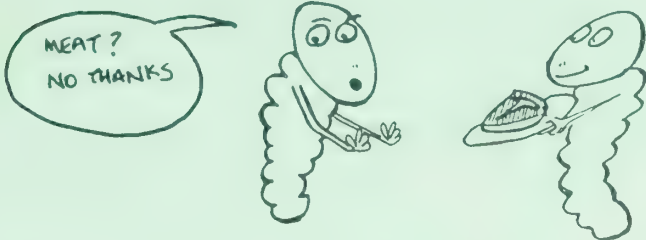
Before planting flowers and vegetable gardens you can spread a layer compost of up to 7.5 cm (3") and then dig it in well with the existing soil. For a rich and light potting soil for house plants, mix finished compost with equal amounts of soil and sand. Bedding flats or starting flats should have no more than 1/3 (screened) compost mixed with 1/3 soil and 1/3 sand, perlite or vermiculite.

DID I TELL YOU HOW WELL THE TOMATOES ARE DOING SINCE I DUG IN THE COMPOST?

The compost should be used right away, or at least within six months, otherwise it will lose too much of it's nutrient value to be of any benefit to your garden. To store the compost, cover it with a plastic or canvas tarp to discourage leaching (washing away with the rain).

Another good use for compost is compost tea where you put compost in a container of water and use it to water your garden and flower beds. For specific instructions see Page All.

9. TROUBLESHOOTING PROBLEMS

PROBLEM	CAUSE	SOLUTION
Animals and flies 	Attracted by odour of food	-don't put in fats, meats, cooked food, bones -dig under any food immediately or cover with thin layer soil -cover container or pile with lid, weigh down lid, surround bottom with chicken wire
Process slow	Too much carbon material such as sawdust, leaves etc.	-add high nitrogen material (greens) like grass clippings, kitchen scraps, fruit waste, rotted manure, etc.
Bad odour	Not enough air materials or too wet	-turn or mix up the with shovel or pitchfork
Odour of ammonia	Too much nitrogen materials (grass, leaves, fruit, scraps, etc.)	-add high carbon materials (browns) sawdust, leaves, shredded paper, straw, etc.
Centre of pile is dry	Not enough water	-moisten materials with water while turning the pile
Pile is damp and sweet smelling but will not heat up	Lack of nitrogen	-add nitrogen sources (greens)-fresh grass clippings, fresh manure, commercial fertilizer high in nitrogen)
Damp and warm	Pile is too small in middle of only	-collect more material and mix with old pile ingredients

10. HELPFUL HINTS

This guide is only one of many sources of information on composting which is available to the residents of Hamilton-Wentworth. Your local library will have several shelves of books and magazines that you can read to find out more detail or different information on this topic. For a list of the ones we've used for reference, see the References section.

Here are some helpful hints that we've found for you...

1. Collect kitchen scraps in a plastic bucket with a tightly fitting lid. Store this bucket in your garage, under the sink or near your composter until you have enough to make a 2-4" layer of greens or it is full. Add a handful of sawdust, if it is available, to keep the odours down.
2. Run over leaves with the lawn mower two or three times and chop up large item like corn cobs, banana peels and apple cores (smaller pieces break down faster).
3. Cow, sheep and horse manure are good sources of minerals and can be safely used in your composter but not dog and cat waste since they contain organisms which can cause disease in humans.
4. If you treat your lawn with chemicals, don't put your grass clippings in your composter. The chemicals will get into your vegetables if you use your compost on your vegetable garden.
5. Don't use pressure treated lumber to construct your own bins or else the chemicals could get into your vegetables. Natural non-toxic wood preservatives are available on the market.
6. If your pile gets very hot, starts billowing smoke, and is very smelly, you should turn it more often. Also see the Chart on Page 9.
7. If you are really concerned about the health of your soil and how it affects your vegetables, read the book "Gardening for Maximum Nutrition" by Gerry Minnich (see References on Page 12).
8. Composting will occur more quickly and easily if the pile is 3ft. by 3ft. by 3ft. at minimum.
9. Avoid clumps of materials. Break up matted grass or shredded paper and mix it in thoroughly so that all surfaces of the material is exposed.
10. A good indication of when to turn the compost pile is when it does not feel warm. Turning makes it heat up again. When it no longer heats up at all, then it is finished and ready to use.

11. KNEE-DEEP IN LEAVES & GRASS?

Pound for pound, the leaves of most trees contain twice as many minerals as manure. The simplest way to compost leaves is to let them pile up in a corner of your garden to rot by themselves. This will be a slow process but eventually the pile will be drastically reduced in size and the resulting material can then be dug into your garden to lighten the soil. To speed up the process you can add manure (1 part manure to 5 parts leaves) which is high in nitrogen, or you can shred or grind your leaves with a rotary mower (with or without mulching attachment).

Another option for leaves is to make leaf mold. This can be done in 2 ways. Firstly, shred the leaves with a lawn mower, next place them in garbage bags; moisten with water; close the bags and then leave them to sit all winter. In the spring split open the bags and mix the mold into your garden.

A second way to make leaf mold is to construct a circular enclosure of snow fencing like the one on page A4. Gather the leaves; wet them thoroughly, then tamp them down in the enclosure. In the spring you will have a black, crumbly, slightly acidic mulch for mixing into your garden or you can add it to your compost pile for further decomposition.

If you choose to make leaf mold in garbage bags, these bags can also serve another purpose. Lay them on top of beds of root vegetables at the end of the season to insulate them and then you can dig up your carrots, rutabaga or parsnips anytime you want them in the winter. The leaf mold holds large amounts of water and will improve the structure of the soil just like compost.

Now if you have a lot of grass, you should know that recent studies have shown that lawns will be thicker and healthier if grass cuttings are left on top after mowing. The researchers used a lawnmower with a mulching attachment but the same result can happen if you cut your lawn frequently. The shorter the blades left on the ground, the quicker they will decompose. Otherwise try leaving half of the grass clippings on the ground and use the rest for the composter. This is especially helpful in hot, dry weather as the grass clippings will help to keep moisture on the lawn.

Caution should be taken if you spray your grass or leaves with herbicides or pesticides. Do not use these materials in your compost pile if the compost is going to be used on your edible vegetables.



RESOURCES AND REFERENCES

REFERENCES:

* Note - all of these books or magazines were found in the Hamilton Central Library. We have provided the call number in brackets, for each book, so that you can find it yourself more easily.

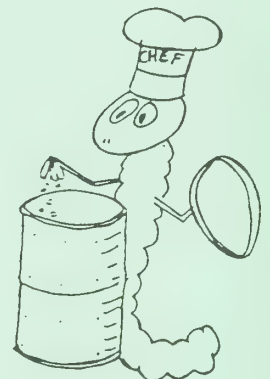
1. "Worms Eat My Garbage". Mary Applehof. (631.875 App)
2. "Everyone's Guide to Home Composting". Robyn Bem. (631.875 Bem)
3. "Let it Rot: The gardener's guide to composting". Stu Campbell. (631.875 Cam)
4. "The Incredible Heap. A Guide to Composting". Chris Catton & James Gray. (635.0484 Cat)
5. "Garbage As You Like It". Jerome Goldstein. (628.445 G578)
6. "Composting: A Study of the Process and It's Principles". Clarence Golueke. (631.875 Gol)
7. "HARROWSMITH" Magazine, June-July 1984, Page 22.
8. "HARROWSMITH" September-October 1989, Pages 104 & 106.
9. "Gardening for Maximum Nutrition". Jerry Minnich. (635 Min)
10. "The Rodale Guide to Composting". Jerry Minnich & Marjorie Hunt (631.875 M666 or 631.875 Min)
11. ORGANIC GARDENING AND FARMING. "Organic Fertilizers: Which Ones and How to Use Them" (631.86 Org)
12. "Pay Dirt: Farming & Gardening with Composting". Jerome Rodale. (631.875 R611)
13. "RODALE'S ORGANIC GARDENING" Magazine, August 1987
14. "SUNSET" Magazine, April 1987.
15. "SUNSET GUIDE TO ORGANIC GARDENING" (631.58 Sun)

RESOURCES:

1. Recycling Council of Ontario Ontario Recycling Information Service 1-416-960-0938 or 1-800-263-2849 (toll free)
2. Seattle Tilth Association and Seattle Engineering Department's Solid Waste Utility, Community Composting Education Program, Compost Hotline 1-206-633-0224.

June 1990

Department of Engineering, Solid Waste Section
The Regional Municipality of Hamilton-Wentworth
Research- S. Howe
Illustrations- P. Jensen



COMPOSTER DESIGNS - Holding Unit 1

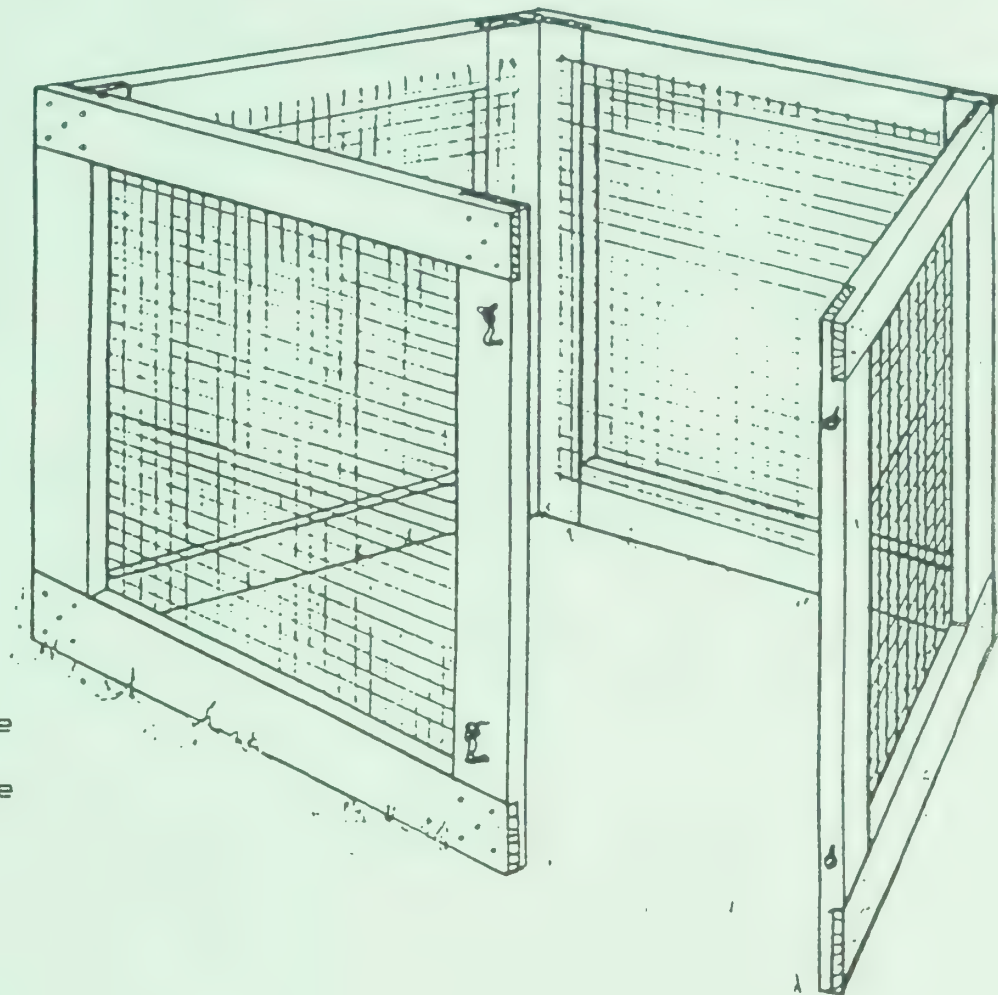
PORTABLE WOOD & WIRE COMPOSTING BIN

This composting unit is very flexible. It can be moved easily to turn a pile or to build a new one. Simply undo the latches, pull the sides apart, and move it. It can also be used as a stationary unit, and works well in small spaces.

MATERIALS

(approximately \$80)

- 1 - 12' 2"x4"
- 3 - 12' fir 2"x4"
- 12' of 36" wide 1/2" hardware cloth
- 100 - 1 1/2" galvanized no. 8 wood screws
- 4 - 3" galvanized butt door hinges
- 150 poultry wire staples or power stapler
- 1 - 10 oz. tube exterior wood adhesive
- 4 large hook and eye gate latches

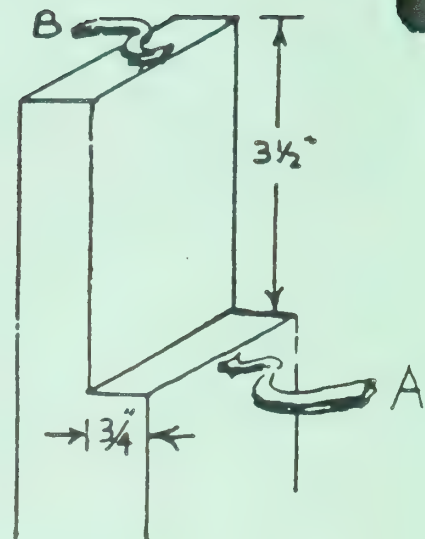


TOOLS:

- Handsaw and chisel,
- or radial arm saw with dado blade,
- or circular saw,
- or table saw
- Hammer
- Screwdriver
- Tinsnip
- Caulking gun
- Pencil
- Small carpenter's square

CONSTRUCTION:

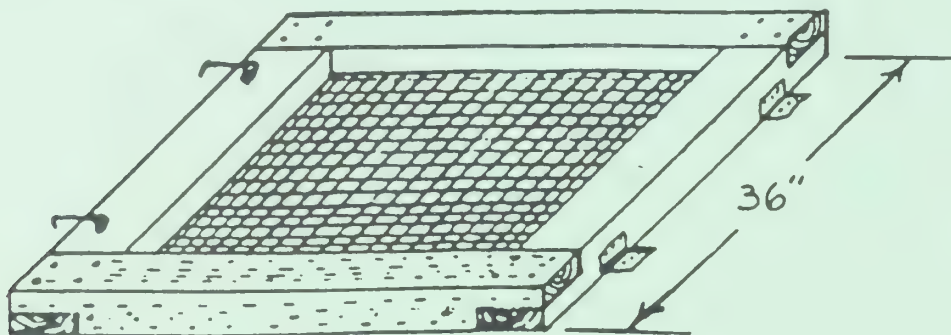
Cut each 12' 2"x4" into four pieces 3' long. Cut a 3/4" deep and 3 1/2" wide section out of each end, for a total of 32 lap cuts. If using a handsaw and chisel, cut 3/4" down at the 3 1/2 inch line - at A in diagram at right. Then cut a 1/2" deep grove into the end of the board - at B in the diagram. Place a thick wood chisel in the end grove and split the wood with a hammer to the 3 1/2" cut. If using a radial arm saw, circular or table saw, set the blade to 3/4" depth and make multiple passes until the whole section is removed.



Make four 3' square frames from the lap-jointed 2"x4"s. Put enough construction adhesive to fill the gaps when the lap joints are screwed together. Fasten each joint with four screws.

Cut the hardware cloth with tinsnips into four 3' square sections. Bend the edges of the cloth back over 1" for strength. Lay one onto each of the four frames. Centre and tack each corner with a poultry wire staple. Try to tension the cloth so it will not sag when filled with compost.

Connect each pair of frames together with two hinges. Then put the hook and eye gate latches on the other ends so that the sections latch together.



For more information on composting or recycling programs in your community, contact the Ontario Recycling Information Service, a service of the Recycling Council of Ontario, at (416) 960-0938 (Toronto area) or 1-800-263-2849 (toll-free)

(This design sheet was originally produced for the Community Composting Education Program in Seattle, Washington.)

COMPOSTING DESIGNS - Holding Units 2 & 3

DRUM, CEMENT BLOCK and SNOW FENCE BINS

DRUM BIN

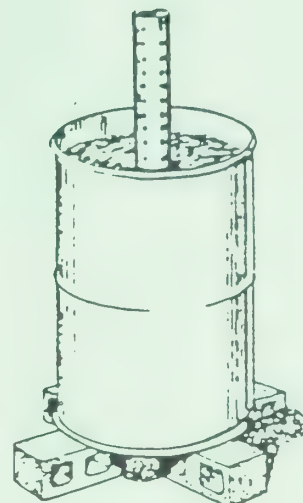
A plastic or metal drum may be used as a composter. It requires very little space in your backyard, and is inexpensive and easy to set up.

Materials:

Metal or plastic drum (food grade)
Aeration stack (use drainage pipe or wire mesh)

Procedure:

Remove the top and bottom of the drum. Puncture holes around it and/or place an aeration stack in the centre of the heap. You may raise the drum off the ground for additional ventilation.



CEMENT BLOCK BIN

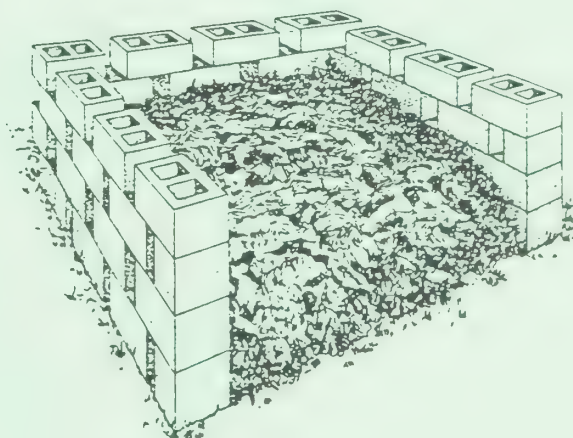
Cement blocks or bricks may be used to build a composter. It is easy to set up, and can be constructed with two sections to facilitate turning the pile.

Materials:

48 cement blocks

Procedure:

Lay the blocks with the holes sideways, or place them with the holes vertical and leave spaces between them for aeration.



COMPOSTER DESIGNS - Holding Unit 4

SNOW FENCE BIN

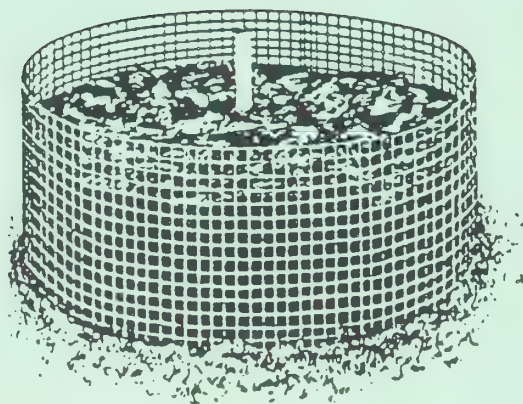
Wood or plastic snow fencing (or chicken wire) can be used to make a composter that is inexpensive and very easy to set up. If you wish to turn the pile, remove the fence, set it up beside the first pile, and turn the compost into the newly set-up bin.

Materials:

Wood or plastic snow fencing (the optimum size is three feet in diameter, but this can vary according to your needs)
Metal wire

Procedure:

Make a circle with the fencing and tie it with metal wire.



For more information contact:

Ontario Recycling Information Service
489 College St., Room 504
Toronto, Ontario M6G 1A5
960-0938 (Toronto area)
1-800-263-2849 (toll-free)

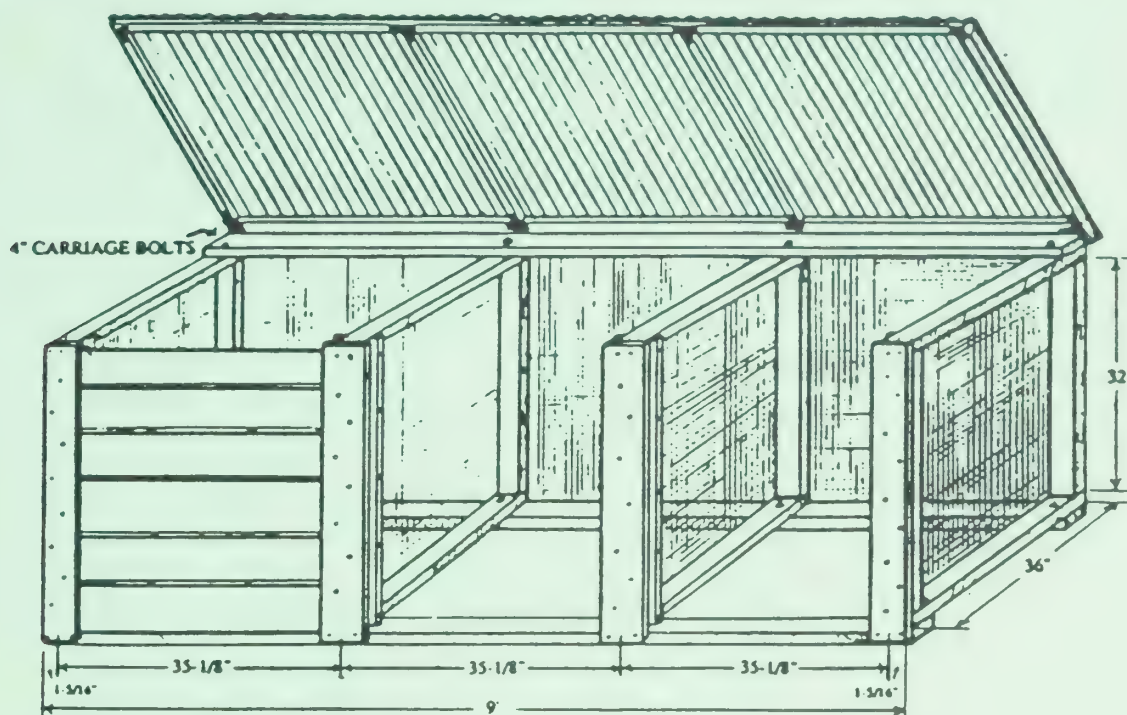
Produced by the Ontario Recycling Information Service, a service of the Recycling Council of Ontario

Updated January 1990

COMPOSTER DESIGNS - Turning Unit 1

WOOD AND WIRE STATIONARY 3-BIN SYSTEM

This system is used to compost large amounts of yard and kitchen wastes in a short period of time. Compost piles are made and turned on a regular basis. This unit can be built for approximately \$215. Construction requires basic carpentry skills and tools.



MATERIALS

- 2 - 18' 2"x4"s *
- 4 - 12' or 8 - 6' 2"x4"s *
- 1 - 9' and 2 - 6' 2"x2"s
- 1 - 16' cedar 2"x6"
- 9 - 6' cedar 1"x6"s
- 22' of 36" wide 1/2" hardware cloth
- 12 - 1/2" carriage bolts 4" long
- 12 washers and 12 nuts for bolts
- 2 lbs of 3 1/2" galvanized nails
- 1/2 lb. 2 1/2" galvanized casement nails
- 200 poultry wire staples (or rent power stapler with 1" staples)
- 1 - 12' and 1 - 8' sheet 4 oz. clear corrugated fibreglass
- 3 - 8' lengths of wiggle molding
- 40 gasketed aluminum nails for corrugated fibreglass roofing
- 2 - 3" zinc-plated hinges for lid
- 8 flat 4" corner braces with screws
- 4 flat 3" t-braces with screws

* Do not use pressure-treated or chemically-treated wood for your compost bin. Teekah Inc. (5015 Yonge St., North York, Ont. M2N 5P1, 229-4199) sells non-toxic wood preservatives.

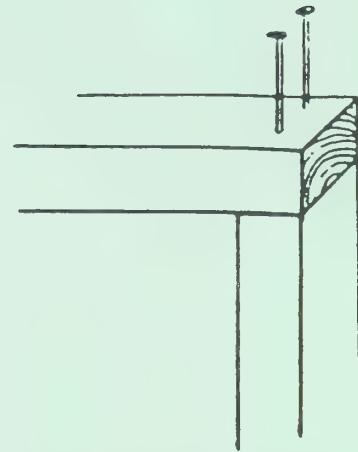
Wood and Wire Stationary 3-Bin Cont'd

TOOLS

Handsaw or circular power saw
 Drill with 1/2" and 1/8" bits
 Screwdriver
 Hammer
 Tinsnips
 Tape Measure
 Pencil
 3/4" socket or open ended wrench
 Carpenter's square
 Safety glasses and ear protection

CONSTRUCTION

Build Dividers Cut two 31 1/2" and two 36" pieces from each 12' 2"x4". Butt end nail the four pieces into a 35" x 36" square. Repeat for the other three sections. Cut four 37" long sections of hardware cloth, and bend back the edges 1". Stretch the hardware cloth across each frame, check for squareness of the frame, and staple the screen tightly into place every 4" around the edge.



BUTT NAIL DIAGRAM

Set Up Dividers Set up dividers parallel to one another and 3 feet apart. Measure and mark centre for the two inside dividers. Cut four 9' pieces out of the two 18' 2"x4" boards. Place two 9' base boards on top of the dividers and measure the positions for the two inside dividers. Mark a centre line for each divider on the 9' 2"x4". With each divider line up the centre lines and make the base board flush against the outer edge of the divider. Drill a 1/2" hole through each junction centred 1" in from the inside edge. Secure the base boards with carriage bolts, but do not tighten yet. Turn the unit right side up and repeat the process for the 9' board. Using the carpenter's square or measuring between opposing corners, make sure the bin is square, and tighten all bolts securely. Fasten a 9' long piece of hardware cloth securely to the back side of the bin with staples every 4" around the frame.

Front Slat and Runners Cut four 36" long 2"x6"s for front slat runners. Rip cut two of these boards to 4 3/4" wide and nail them securely to the front of the outside dividers and baseboard, making them flush on top and outside edges. Save the remainder of rip cut for use as back runners. Centre the remaining full width boards on the front of the inside dividers flush with the top edge, and nail securely. To create back runners, cut the remaining 2"x6"s into a 34" long piece and then rip cut into 4 equal pieces, 1 1/4" x 34". Nail the back runner parallel to the

COMPOSTER DESIGNS - Turning Unit

Wood and Wire Stationary 3-Bin Cont'd

front runners on side of divider leaving a 1" gap for slats. Cut all the 1"x6" cedar boards into slats 31 1/4" long.

Fibreglass Lid Use the remaining 9' 2"x4"s for the back of the lid. Cut four 32 1/2" 2"x2"s and one 9' 2"x2". Lay out into position on the ground (as illustrated on the front) and check for squareness. Screw in the corner braces and T braces on the bottom side of the frame. Centre the lid frame, brace side down, on the bin structure and attach with hinges. Cut the wiggle board to fit the front and back 9' sections of the lid frame. Pre-drill the wiggle board with 1/8" drill bit and nail with 2 1/2" casement nails. Cut fibreglass to fit flush with the front and back edges. Overlay the pieces at least one channel wide. Pre-drill the fibreglass and wiggle board for each nail hole. Nail on top of every third hump with gasketed nails.

For more information on composting or recycling programs in your community, contact the Ontario Recycling Information Service, a service of the Recycling Council of Ontario, at (416) 960-0938 (Toronto area) or 1-800-263-2849 (toll-free).

(This design sheet was originally produced for the Community Composting Education Program in Seattle, Washington).

ROTATING BARREL COMPOSTER

If your composting operation is small and you neither relish nor have the time for turning garbage, then you'll find this composter suited to your needs. The barrel is rotated several times whenever new materials are added. It is constructed with a minimum of hand-powered tools, and is not difficult or time-consuming to build. It will cost about \$60 to build providing you use a second-hand barrel.

MATERIALS

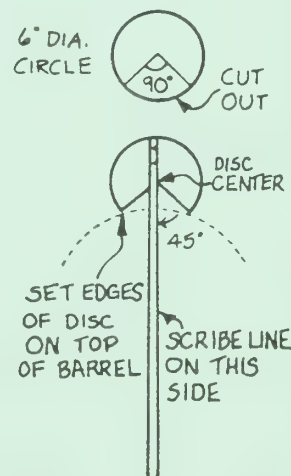
1 - 45-gallon drum, use 'food grade' drum only (composter)
 4 - 40 x 2 x 4" (frame uprights)
 2 - 29 3/4 x 2 x 4" (frame horizontals)
 2 - 40 5/8 x 1 x 3" (cross braces) white pine
 4 - 23 3/4 x 1 x 3" (corner braces) white pine
 2 - 27 x 2 x 4" (cross boards) white pine
 2 - 7 1/2" dia. x 3/4" (bearings) white pine or plywood
 2 - 2 3/4" dia. x 3/4" (bearings) white pine or plywood
 2 - 1 1/2 x 2" hinges
 1 - small hasp
 1 - 1/2 x 40 1/2" steel rod
 8 - 1/4 x 1 1/4" stove bolts
 12 - 1/4 x 1" stove bolts
 28 - 1 1/2" #10 wood screws
 wood glue
 approximately 1 pint of flat black paint

CONSTRUCTION

1. Obtain a good 45-gallon drum that has not had any toxic chemicals in it. Ask for a 'food grade' barrel. It must be unpainted on the inside and de-rusted. Add a protective coating inside. (A natural metal primer for steel and iron can be obtained from Teekah Inc., 5015 Yonge St., North York M2N 5P1 (416) 229-4199. Ask for product #234.) A plastic drum can also be used.

2. Drill a 1/2" hole in the exact centre of both ends of the barrel to accommodate the 1/2" steel rod. (See illustration for how to make a simple tool to locate centres.) Hold the rounded end of the gauge anywhere along the circumference and scribe a line on the approximate centre. Move the gauge 90 degrees and scribe another line. The intersection of these lines will be the exact centre.

3. Next scribe the lines for the opening in the barrel making sure to round the corners slightly. Drill a 1/4" hole somewhere along one of the lines to start the saber saw. If your barrel has ribs, as most do, you will have to cut a 1" vee notch on each rib to facilitate opening the door. Attach the hinges and the hasp to the barrel and lid using 1 x 1/4"

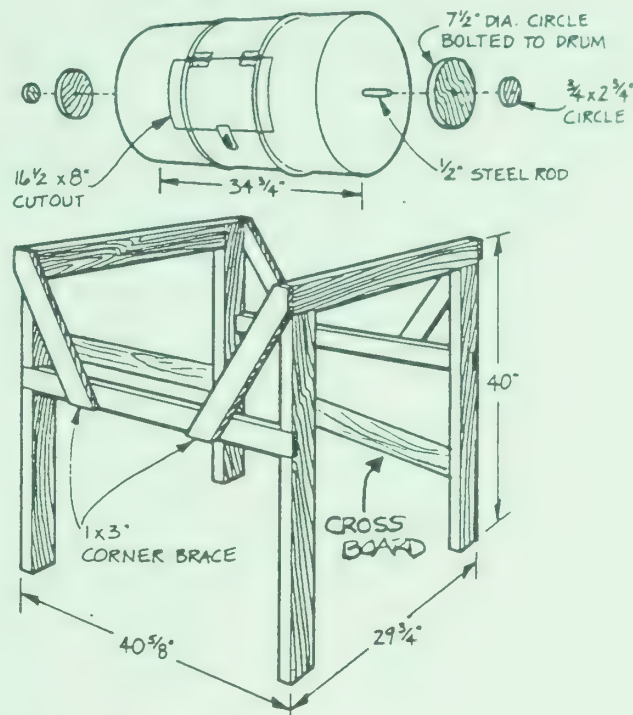


stove bolts.

4. From $\frac{3}{4}$ " white pine, cut two circles $7\frac{1}{2}$ " in diameter and two circles $2\frac{3}{4}$ " in diameter. Drill a $\frac{1}{2}$ " hole in the centre of each and apply glue to the $2\frac{3}{4}$ " circles. Glue the $2\frac{3}{4}$ " circles to the $7\frac{1}{2}$ " circles. This can be done easily if the circles are temporarily slipped over the $\frac{1}{2}$ " steel rod and clamped. After the glue has dried, remove the disks, insert the rod through the barrel and assemble as shown in the illustration, using four $1\frac{1}{4} \times \frac{1}{4}$ " stove bolts in each.

5. To build the support frame, cut the 2-by-4's to length and, using a corner lap joint, assemble with two $1\frac{1}{2}$ " #10 wood screws in each joint. The uprights will also have to be dadoed 23 inches from the bottom to accept a 1×3 " board. To make a corner lap joint, simply remove one-half the thickness of the stock to a length comparable to the width of the stock, on both ends of all pieces.

6. Half-inch holes to accommodate the rod will have to be drilled in the exact centre of the top horizontal pieces before assembling the top portion of the support frame. Slip the $\frac{1}{2}$ " steel rod with barrel attached, through these holes and insert the cross members into the dadoed uprights. Fasten with $1\frac{1}{2}$ " #10 wood screws. Next cut the $1 \times 3 \times 23\frac{1}{4}$ " piece at 45-degree angles at both ends, and attach with $1\frac{1}{2}$ " #10 wood screws across corners as shown in the illustration.



7. For extra support, use $2 \times 4 \times 27$ " cross boards on each side. Cut them to an angle as the upper end is at $14\frac{1}{2}$ " and lower end at 29" from the top of the 2×4 frame horizontals.

8. Drill several rows of $\frac{1}{4}$ " holes along the bottom of the barrel exactly underneath the door opening to eliminate excess moisture. Paint the outside of the unit a flat black colour.

For more information on composting or recycling programs in your community, contact the Ontario Recycling Information Service, a service of the Recycling Council of Ontario. Call (416) 960-0938 (Toronto area) or 1-800-263-2849 (toll-free).

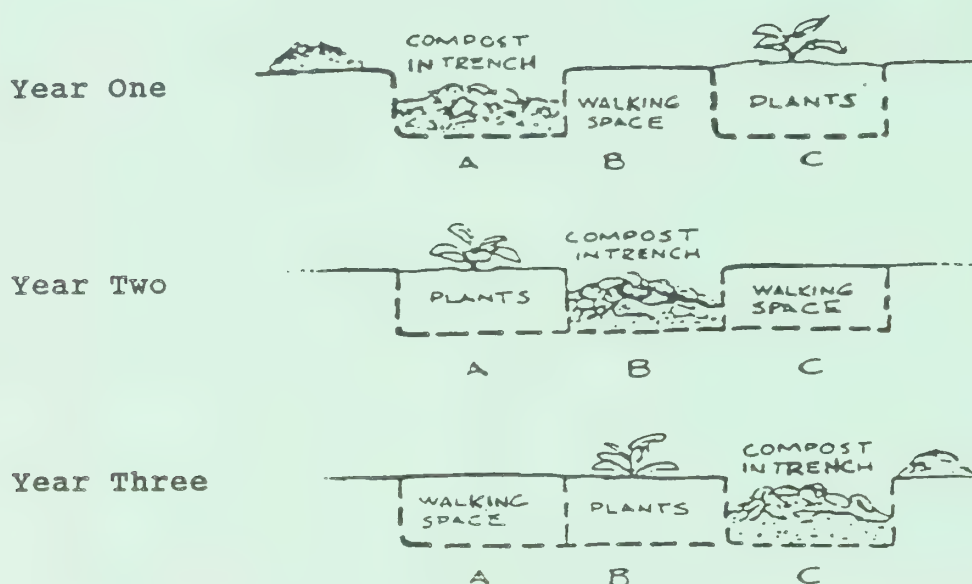
(This design information was taken from the book The Rodale Guide to Composting, by Jerry Minnich, Marjorie Hunt, and the Editors of Organic Gardening Magazine, Rodale Press, Emmaus, PA)

COMPOSTING METHODS

SOIL INCORPORATION

Soil incorporation is the simplest method of composting kitchen wastes. Kitchen wastes such as vegetable cuttings and fruit peels are chopped and mixed into the soil, then covered with at least 8" of additional soil. Depending on soil temperature the number of micro-organisms in the soil, and the carbon content of the wastes, decomposition will occur in one month to one year. Food wastes such as meat, bones and fatty foods are not recommended for soil incorporation as they could attract rodents, dogs, cats and flies.

Eg. Pit and Trench Composting



English gardeners practice a form of soil incorporation known as "pit and trench composting". This is a simple three year rotation of composting kitchen wastes, growing crops, and pathmaking.

In the first year, a trench is dug (area A in the diagram above), filled with food wastes and covered. At the same time, another row (B) is used to grow crops and a third (C) is used as a path. In the second year, the fertile soil of the former compost trench is used to grow crops, and the former walking path (B) is used as the new compost trench, and the former crop row (C) is used as a path. After a third year of rotation, the cycle starts over again. This form of composting keeps the garden perpetually fertile with a small amount of organizational effort.

COMPOST TEA

One way to use finished compost is to make compost tea. Place the compost in a burlap bag and insert it in a barrel of water. Let it steep for a few days. The nutrient-rich tea can then be used on your garden.

Materials:

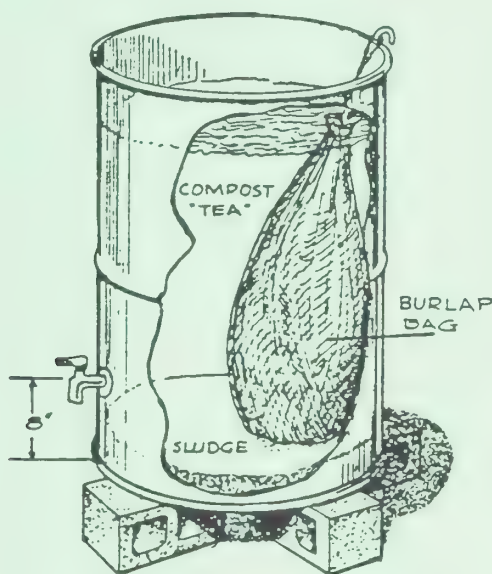
plastic drum
tap
silicone
screen mesh

Procedure:

Place a tap at the bottom of the drum. Seal it with silicone and place a wire mesh over the tap from the inside of the drum. You can add a lid if you wish.

Variation:

On a smaller scale, you can fill a watering can half and half with water and finished compost, and let it steep until the compost tea is ready.



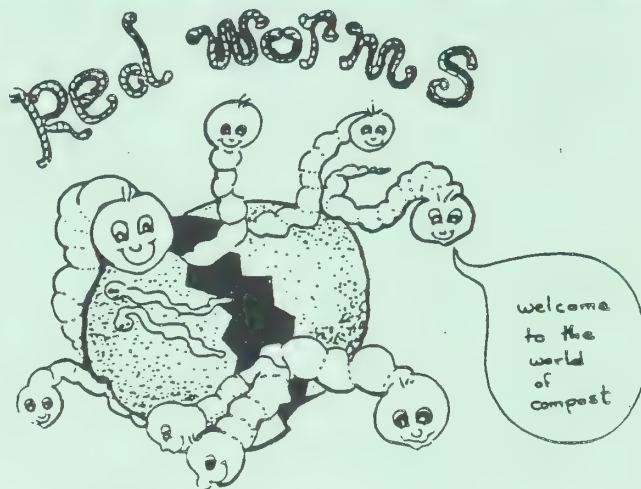
For more information, contact:

Ontario Recycling Information Service
489 College St., Suite 504
Toronto, Ontario M6G 1A5
960-0938 (Toronto area)
1-800-263-2849 (toll-free)

Produced by the Ontario Recycling Information Service, a service of the Recycling Council of Ontario.
August 1988

VERMICOMPOSTING

Composting is a natural process where kitchen and yard wastes decompose into a dark, nutrient-rich, earth-smelling soil conditioner. Perhaps you've considered backyard composting but live in a high rise or don't relish the thought of tramping through your garden in the middle of a winter blizzard. In which case, vermicomposting is the option for you.



What is vermicomposting?

Vermicomposting is simply composting with worms. The best kind of earth worm to use is the Redworm. These worms are incredible garbage eaters! They eat and expel their own weight every day so even a small bin of Redworms will yield hundreds of pounds of rich sweet-smelling compost. Finished compost can be harvested in as little as two to three months. Redworms (aka "red wigglers") are extremely prolific. It takes about three weeks for an egg to develop and as many as twenty youngsters can be hatched from one egg. In three months the worms are sexually mature and will start breeding. Within a year you'll be able to give worms away to get a friend started!

Where can I get a worm bin?

For 1 or 2 people a plastic bin can be purchased from a hardware store. Make sure the bin has a lid. A good sized bin is available in Toronto from the "The Moving Store" (416) 789-4188. For 4 to 6 people, there is a design sheet to build your own bin which is available from the RCO.

# People	Quantity of Worms	Bin Size
1 or 2	1 lb.	1ft x 1.5 ft x 2ft
2 or 3	2 lbs.	1ft x 2ft x 2ft
4 to 6	3 to 4 lbs.	1ft x 2ft x 3.5ft

How do I set up the bin?

Make sure 8-10 holes (approx 1/8") are drilled in the bottom of the bin for adequate drainage. Raise up the bin on some type of blocks with a tray underneath. Now you need to think about bedding for the worms. Redworms can survive and breed in many kinds of bedding materials. The important thing to remember is that the "red wiggler" is a manure worm and will eat its own bedding. Materials such as straw, grass clippings, dried leaves, chopped plants, dampened peat moss, aged animal manures, ground cardboard or shredded paper can all be used. The important thing is to keep the bedding as moist as a very well wrung sponge. Bedding can be mixed eg. half straw, half peat moss. Now comes the fun part....getting the worms!

Where can I get Redworms?

In Ontario, Redworms can be delivered by courier or picked up in person from:

Early Bird Bait and Ecology Farms
RR #1
Smithville, Ontario
L0R 2A0
(416) 643-4251

The Worm Farm
31 Herman Ave.
Toronto, Ontario
M6R 1Y1
(416) 588-5280

1 lb of worms costs \$30.00 to \$35.00 depending on the dealer. This does not include the cost of delivery.

What do I feed them?

Worms will eat just about any type of kitchen waste including vegetable and fruits, coffee grinds, tea bags and egg shells. Its better to avoid starches, meats and fats. Dig the waste into the bedding.



Can worms live outside during colder months?

Worms prefer temperatures between 40 and 80 degrees fahrenheit. If you live in an apartment building they can live quite happily out on the balcony until temperatures drop to 40 degrees. After that they should be taken indoors.

How can I harvest the finished compost?

After about 3 months you'll notice that the volume of materials has dropped substantially and the original bedding is no longer recognizable. At this point the finished compost and worms can be moved over to one side of the bin and new bedding added to the vacant side. Put new food wastes into the fresh bedding only, so the worms will move from the finished compost in search of new food. After about a week remove the lid under a bright light source. The worms are sensitive to light and will burrow away from it. Scoop out the finished compost a few layers at a time and place in a plastic bag until you're ready to use it.

How can I used the finished compost?

Compost can be added directly to the soil in the garden or mixed with potting soil (half and half) for house plants. For further information on how to use finished compost contact the RCO.

This fact sheet is produced by:

Ontario Recycling Information Service (ORIS)
489 College St., Suite 504
Toronto, Ontario
M6G 1A5
(416) 960-0938 Toll free in Ontario: 1-800-263-2849
November 1989

ORIS is operated by the Recycling Council of Ontario with financial support from:



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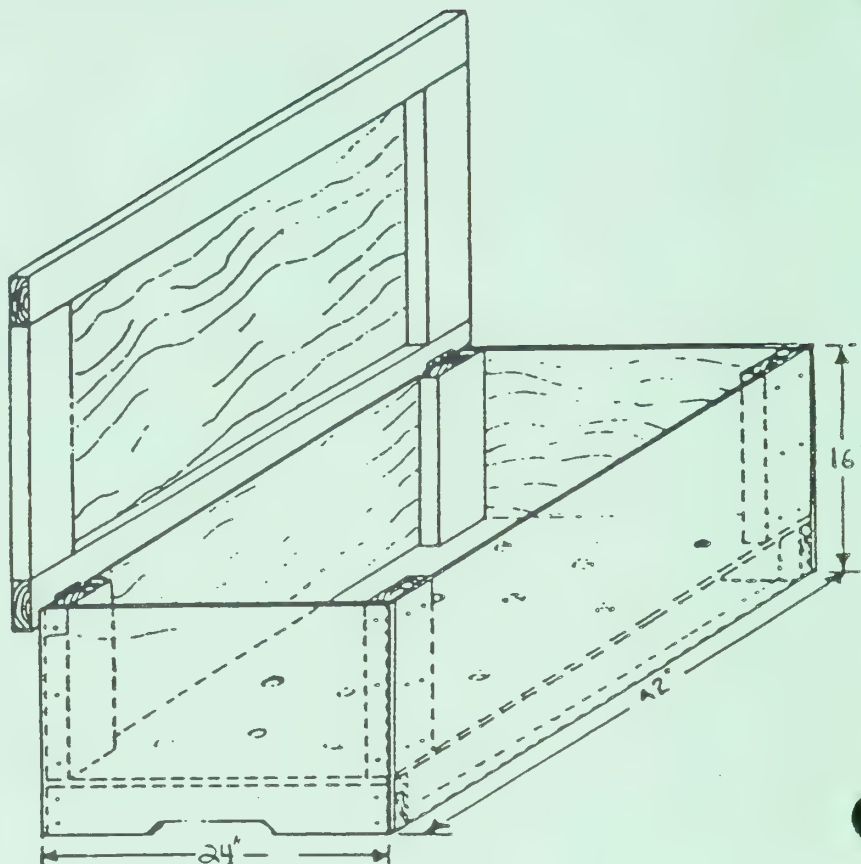
VERMICOMPOSTING BINS

1-2-3 EARTHWORM COMPOSTING BIN

This system is designed for composting food wastes using earthworms. Earthworms produce a high-quality compost suitable for use on house plants, seedling transplants, or for general garden use. This box is sized to suit a family of four to six people generating about 7 lbs. of food waste each week.

This bin can be built for about \$55 with new wood and hardware, or less using recycled materials. A worm bin can be made from old wood boxes or a variety of materials. Any worm bin must have drainage in the bottom and a tight fitting lid to keep the moisture in and pests out. Buying the first batch of worms will be an additional cost.

To maintain this system simply rotate the burial of food wastes throughout the bin. Every 3-6 months compost should be moved to one side of the bin and new bedding added to the empty half. At this time start burying wastes in the new bedding. Within one month worms will have populated the new bedding, finished compost may be harvested and the rest of the bin can be rebedded. This unit is portable. It should be kept in a cool indoor space during the winter and may be placed in a shady outdoor space the remainder of the year. Most pests should not be a problem with a properly-built bin. To ensure adequate aeration, the box can be raised off the ground.



MATERIALS (approximately \$55)

1 1/2" sheet of plywood
 1 12 foot 2"x4"
 1 16 foot 2"x4"
 1 lb. 2" ardox galvanized nails
 1/2 lb. 3 1/2" ardox galvanized nails
 2 galvanized door hinges
 Linseed Oil

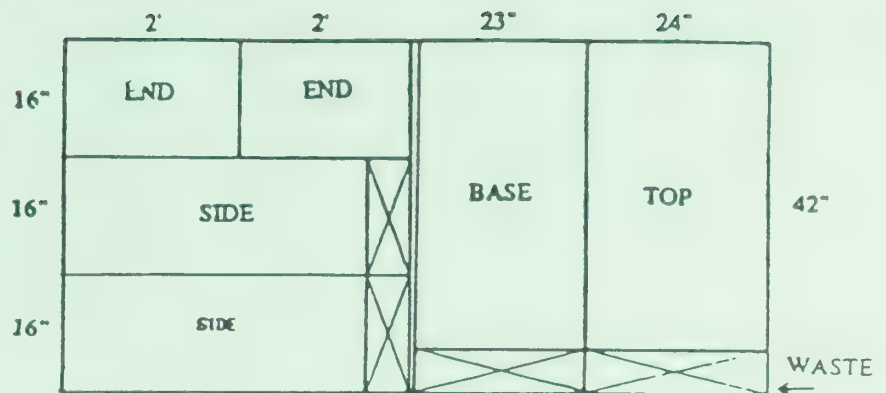
TOOLS

Tape measure, skill saw or rip handsaw, hammer, saw horses, long straight edge or chalk snap line, screwdriver, and drill with 1/2" bit. Use eye and ear protection.

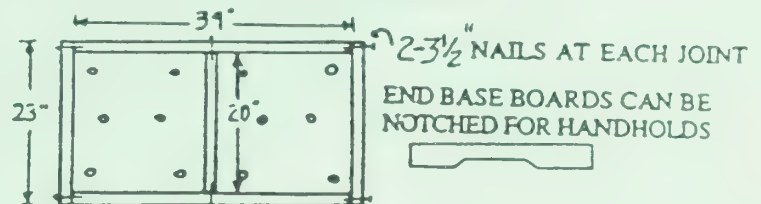
- 2 -

CONSTRUCTION TIPS:

Measure and cut plywood as indicated in the drawing. Cut the 12' 2x4 into five pieces: two 39", two 23", and one 20" long. Nail the 2x4s together on edge with two 3 1/2" nails at each joint as illustrated in the Base Frame diagram. Nail the plywood base piece onto the 2x4 frame.



4'X8' SHEET OF 1/2" PLYWOOD



BASE FRAME

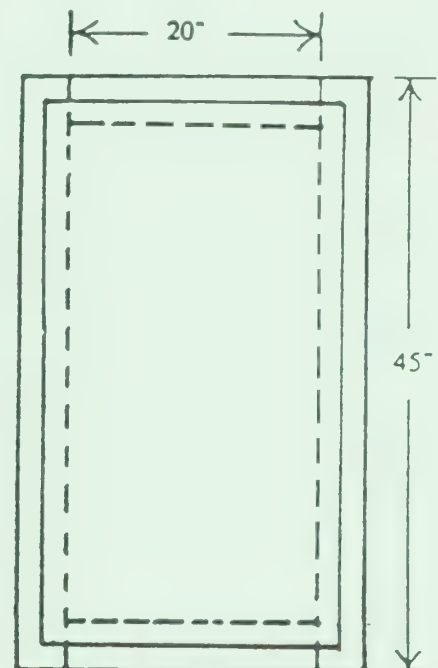
MAKE BIN BASE OUT OF 2X4S STANDING ON EDGE

Cut four 1' lengths out of the 16 foot 2x4. Take each plywood side piece and place a 1' 2x4 under each of its ends so the 2x4 is flush with the top and side edges of the plywood,

and nail the boards into place. Nail the side pieces onto the base frame. To complete the box, nail the ends onto the base and sides. To reinforce the box make sure there is a nail staggered at least every 3 inches wherever plywood and 2x4s meet. Drill twenty 1/2" holes through the bottom of the box for drainage and aeration.

To build the lid, take the remaining 12' 2x4 and cut it into 2-45" pieces and 2-20" pieces and lay them flat, short pieces on the inside as indicated in the diagram above, so that the plywood top is inset from the edges of the 2x4 by 1 1/2" all the way around the perimeter. Nail the plywood onto the 2x4s securely. Place the hinges on the backside of the box at either end of the 2x4s, and on the under side of the 2x4 lid frame, so that the lid will stand upright when opened.

To protect the wood, use a non-toxic wood preservative. (Can be obtained from Teekah Inc., 5015 Yonge St., North York, Ontario M2N 5P1, 229-4199).



TOP LID FRAME

MAKE LID FRAME OUT OF 2X4S LYING FLAT

2 X 2 EARTHWORM COMPOSTING BIN

For a bin that will accomodate the needs of 1 - 2 people generating about 4 lbs. of food each week, follow the directions for this smaller box. It can be built for about \$35 with new wood and hardware, or less if you use recycled materials.

MATERIALS

1 1/2" sheet of plywood
36 2" ardox galvanized nails
500ml linseed oil

TOOLS

same as for larger box

CONSTRUCTION

Cut four pieces of plywood at 23-1/2"x8" for the sides. Nail them together, overlapping the corners.

Cut 1 piece of plywood at 24"x24" for the bottom. Secure the bottom to the sides using about five nails per side. Drill twelve 1/2" holes in the bottom for aeration and drainage. The box should also be raised off the ground on boards to help air circulation.

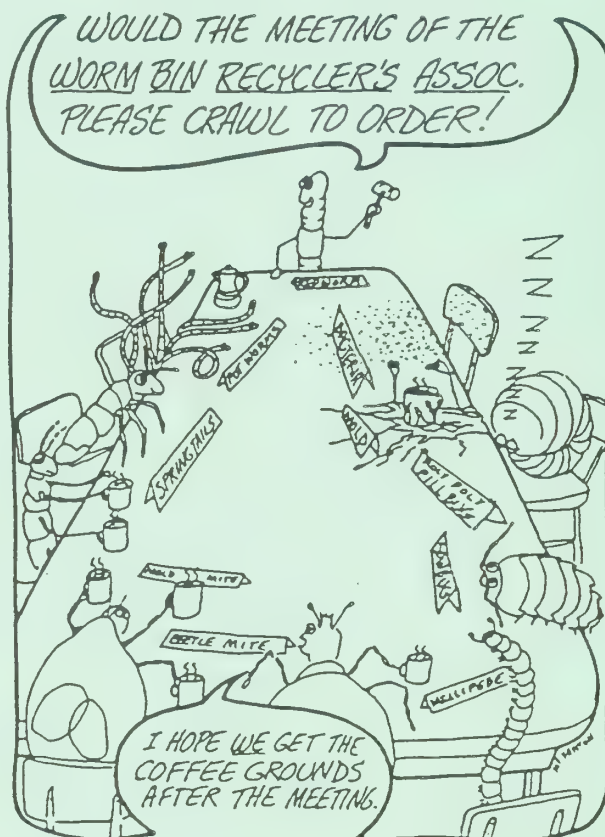
Use a dark plastic sheet over the top of the bedding as a cover or make a lid out of the remaining plywood.

Apply linseed oil inside and outside the bin.

Check your local library for the book, Worms Eat My Garbage by Mary Appelhof, an excellent guide on how set up and maintain a worm composting system. It can also be ordered from: Flowerfield Enterprises, 10332 Shaver Road, Kalamazoo, Michigan, 49002, at a cost of \$8.30 plus shipping.

For more information on composting or recycling programs in your community, contact the Recycling Council of Ontario at (416) 960-0933 (Toronto area) or 1-800-263-2849 (toll-free).

(THIS DESIGN SHEET WAS ORIGINALLY PRODUCED FOR THE COMMUNITY COMPOSTING EDUCATION PROGRAM IN SEATTLE, WASHINGTON.)





This is a publication of the Solid Waste Section of the Regional Municipality of Hamilton-Wentworth Engineering Department.

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For more information on REDUCTION, REUSE, RECYCLING AND RECOVERY in Hamilton-Wentworth call the Engineering Department at (416) 546-4417.



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